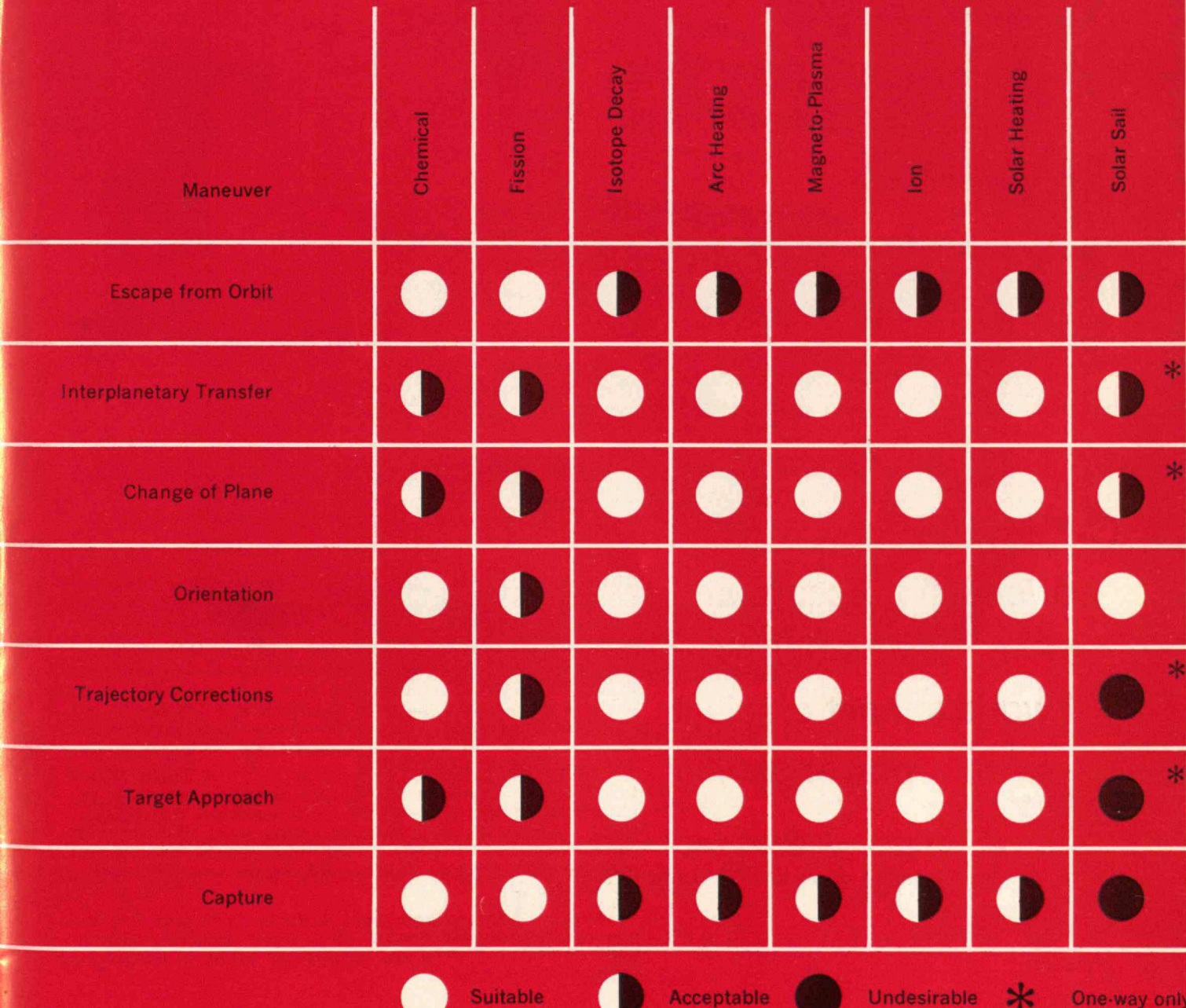
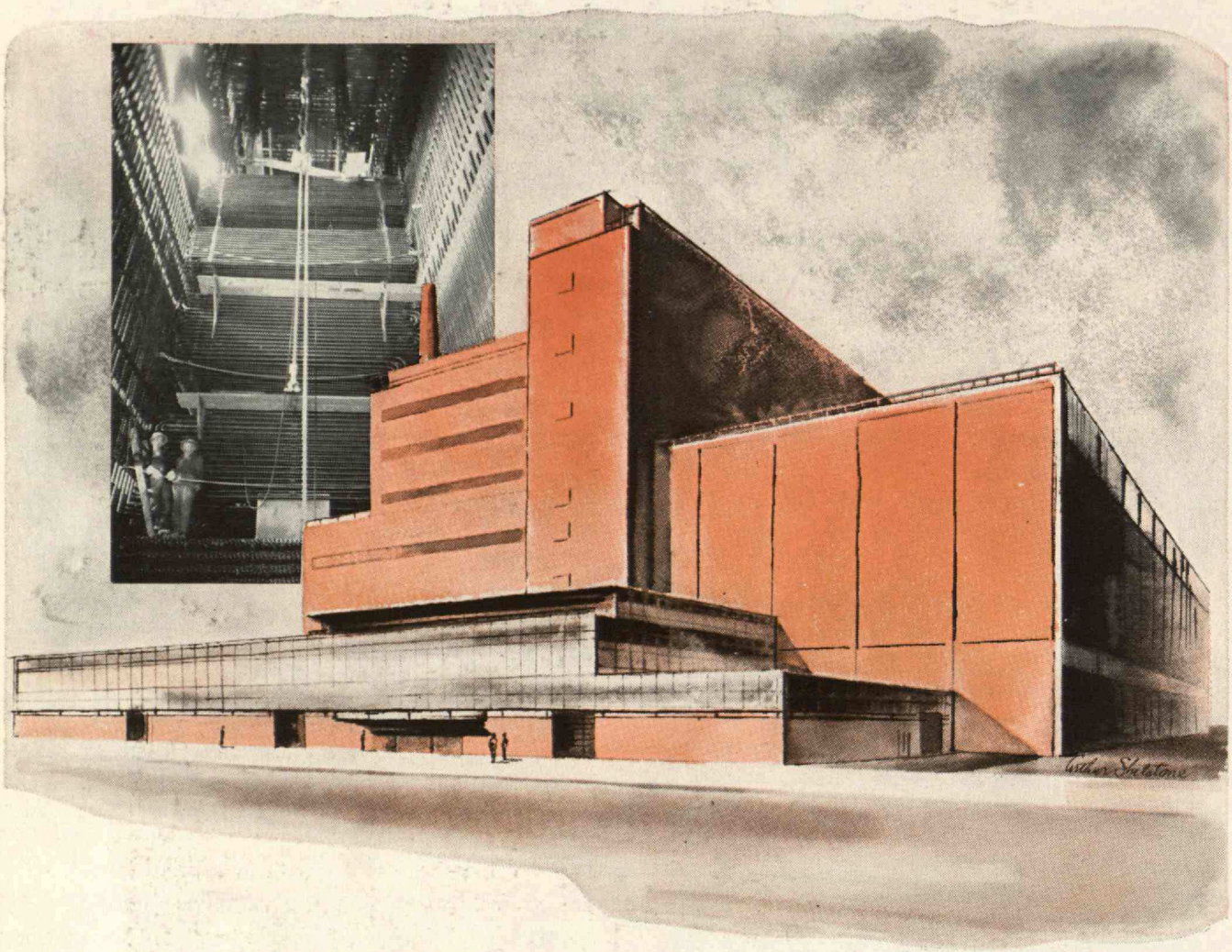
TECHNOLOGY REVIEW

May 1959



"CREATIVE ENGINEERING" POINTS THE WAY TO HIGHER POWER STATION EFFICIENCY



C-E invades new regions of steam pressure and temperature for world's most efficient power station

The completion of the plant pictured above . . . the Eddystone Station of the Philadelphia Electric Company . . . will mark an outstanding achievement in electric power generation.

Scheduled to go into service late this year, Eddystone will produce steam at the highest pressure and temperature ever used in commercial power practice—*5000 lb per sq in and 1200°F.* By so doing, it is expected to generate electricity at a fuel rate of less than two-thirds of a pound of coal per kilowatt-hour—a rate which will establish a new world's record for power station efficiency.

Eddystone's steam will be produced by a C-E Sulzer Monotube Steam Generator, a small portion of which is shown in the photo inset. This 14-story-high boiler is comprised essentially of about 170 miles of small-diameter tubing, much of it made of chromium and nickel alloys. At full load, its twin furnaces will consume about 100 tons of pulverized coal an hour – 40 average carloads per day.

Creative Engineering is the C-E approach to providing the most advanced designs of boilers for all steam requirements—from those of small industrial and institutional plants to the largest utility power stations.

"CREATIVE ENGINEERING" is the reason for the leadership attained by C-E products. The products which bear this mark of leadership include:

all types of steam generating, fuel burning and related equipment • nuclear power systems • paper mill equipment • pulverizers • flash drying systems • pressure vessels • soil pipe

COMBUSTION ENGINEERING

Combustion Engineering Building, 200 Madison Avenue, New York 16, N. Y.

C-E

C-204

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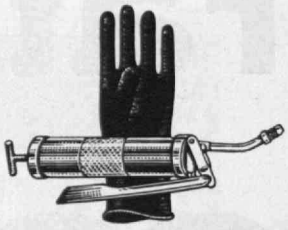
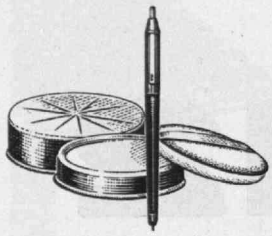


. . . greases or gloves

. . . pens or powders



. . . varnish or vases

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Where do you begin to look for that elusive "something" that gives you a better product?
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CABOT CARBON BLACKS . . . *more than 50 different grades of channel, furnace and thermal blacks for use by the rubber, printing ink, paint, varnish, lacquer, enamel, plastics, paper, phonograph record, battery and other industries.*

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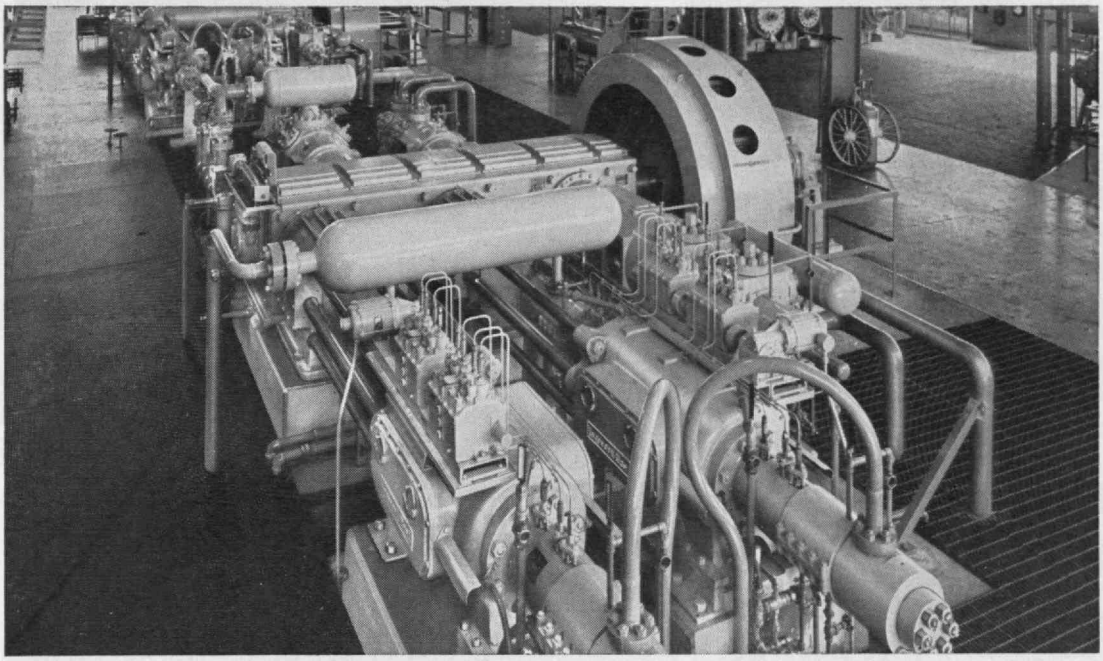
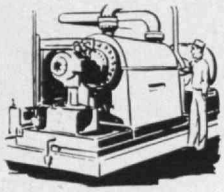
YOUR ENGINEERING CAREER

with INGERSOLL-RAND



Seven electric-driven Ingersoll-Rand reciprocating compressors totaling 21,900 horsepower are at work in this large ammonia synthesis plant. The units in the foreground compress mixed gases to more than 12,000 pounds per square inch.

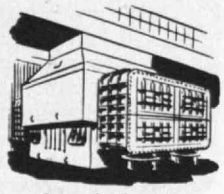
also means LEADERSHIP in



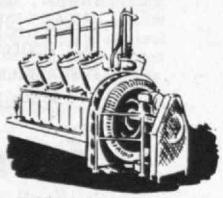
Centrifugal Pumps

Rock Drills

Air & Electric Tools



Steam Condensers



Diesel & Gas Engines

Here's What Compressor Engineering at Ingersoll-Rand can mean to you...

TODAY, air power is one of the industry's most vital requirements. Compressed air and gases are the "breath of life" to chemical and process industries, refineries, power plants, steel mills, manufacturing plants, mines and all types of construction jobs. Hence, compressor and blower engineering offers an exciting and ever-expanding field of challenging opportunities that are virtually industry-wide.

Ingersoll-Rand is the world's largest manufacturer of air and gas compressors and Turbo-Blowers – supplying over 1000 different sizes and types, ranging from ½ hp to 17,250 hp, in pressures from vacuum to 35,000 psi.

Ingersoll-Rand also manufactures pumps, rock drills, diesel and gas engines, vacuum equipment, blowers, air and electric tools and specialized industrial machinery as illustrated at the right. These products require engineering know-how in their design, manufacture and field application.

If you are looking for a leadership career with long-range job security and excellent opportunities for advancement, you'll find it at Ingersoll-Rand. For further details, contact your Placement Office, or write to Ingersoll-Rand, 11 Broadway, New York 4.

OPPORTUNITIES for ENGINEERS NOW AVAILABLE:

- Sales Engineering
- Production Engineering
- Design Engineering
- Business Engineering
- Research And Development

Ingersoll-Rand

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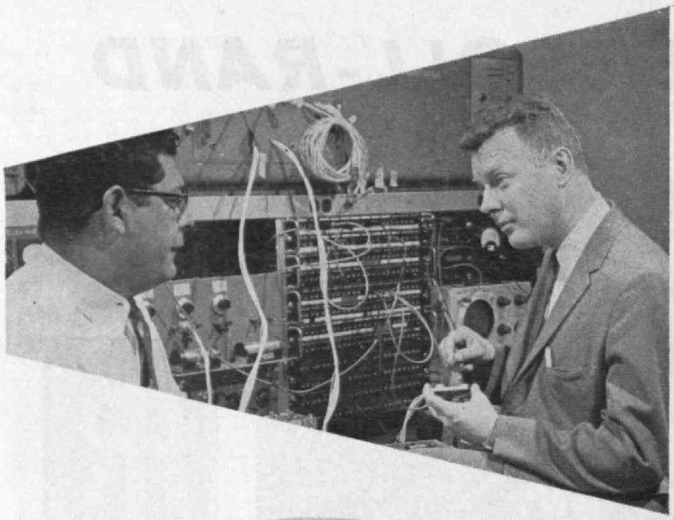
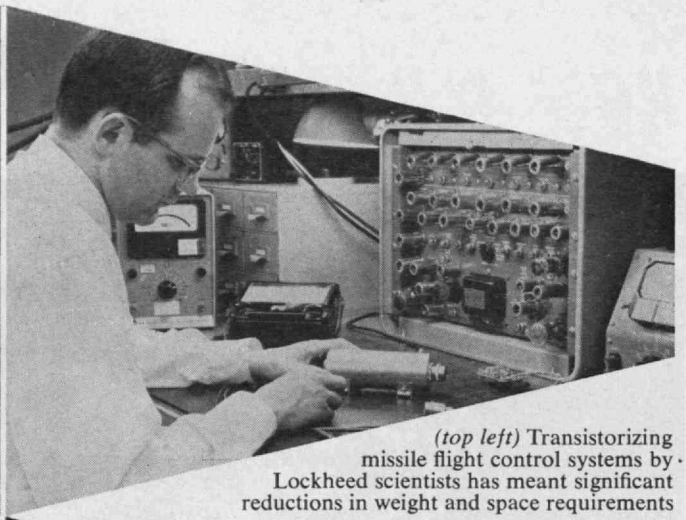
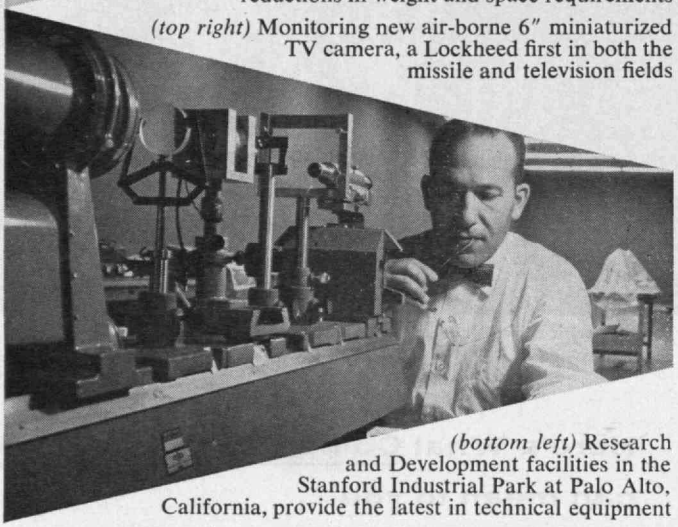
Among the many graduates of Massachusetts Institute of Technology at Ingersoll-Rand are: **L. C. Hopton, 1926,** ***First Vice-President and Secretary;*** **P. J. Bentley, 1925,** ***Vice-President.***





(top left) Transistorizing missile flight control systems by Lockheed scientists has meant significant reductions in weight and space requirements

(top right) Monitoring new air-borne 6" miniaturized TV camera, a Lockheed first in both the missile and television fields



(bottom left) Research and Development facilities in the Stanford Industrial Park at Palo Alto, California, provide the latest in technical equipment

(bottom right) Setting up a diffraction image for a research study in infrared optics

EXPANDING THE FRONTIERS OF SPACE TECHNOLOGY

Lockheed Missiles and Space Division is engaged in all areas of scientific activity – from concept to operation – in missile and space technology.

Important basic research and development work is being conducted in such fields as advanced systems research; nucleonics; physics; chemistry; mathematics; metallurgy; design; test; electronics; aerothermodynamics; gas dynamics; structures; and astrodynamics. Programs under investigation at Lockheed include: man in space; space communications; space physics; re-entry; ionic and nuclear propulsion; cryogenics; magnetohydrodynamics; oceanography; computer development; noise suppression and damage; materials and processes; boundary layer control; electromagnetic wave propagation and radiation; and operations research and analysis.

The Division is systems manager for such major, long-term projects as the Navy Polaris FBM; Discoverer Satellite; Army Kingfisher; Air Force Q-5 and X-7 and other important research and development programs.

Headquarters for the Division are at Sunnyvale, California, on the San Francisco Peninsula, and research and development facilities are in the Stanford Industrial Park in Palo Alto and at Van Nuys in the San Fernando Valley. Facilities are new and modern and include the latest in technical equipment. A 4,000 acre Division-owned static test base in the Ben Lomond mountains near Santa Cruz provides for all phases of static field test. In addition, flight test facilities are provided at Cape Canaveral, Florida and Vandenberg AFB, Santa Maria, California.

Scientists and engineers of outstanding talent and inquiring mind are invited to join us in the nation's most interesting and challenging basic research and development programs.

Write: Research and Development Staff, Dept. E-52, 962 W. El Camino Real, Sunnyvale, California. U.S. Citizenship required.

"The organization that contributed most in the past year to the advancement of the art of missiles and astronautics." NATIONAL MISSILE INDUSTRY CONFERENCE AWARD

Lockheed / **MISSILES AND SPACE DIVISION**

Weapons Systems Manager for Navy POLARIS FBM; DISCOVERER SATELLITE; Army KINGFISHER; Air Force Q-5 and X-7

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25 YEARS AGO

A column of items of interest culled from The Technology Review's files

■ In May, 1934, The Review reported that "convincing testimony as to the quality of graduate work offered at Technology is found in the recently completed survey of graduate schools conducted by a committee of the American Council on Education. In this survey, the first comprehensive study of American graduate work, Technology was rated as distinguished in 10 of the 11 fields in which it offers work for the doctorate. No other institution had such a high percentage of its work rated as distinguished. The only field, Zoölogy, in which the Institute was not listed as distinguished was judged as satisfactory. . . .

"The study covered 35 fields of knowledge, a list of which was sent to the deans of all graduate schools known to be offering work for the doctorate. . . . The secretary of the national learned society in each field was then asked to submit a list of 100 eminent scholars. To these scientific juries were sent lists of the institutions offering work in their fields and the names of the graduate faculty of each. These scholars, numbering more than 2,000, checked the institutions which in their judgment had adequate staff and equipment to prepare candidates for the doctorate, and starred the departments of highest rank.

"Of the 48 states in the Union, 20 have no institution which in the judgment of the juries is adequately staffed and equipped to offer work for the doctorate in any one of the 35 fields considered. Only five institutions (M.I.T., Princeton, Chicago, Harvard, CalTech) were judged as qualified or distinguished in every field in which they offered doctorates."

■ Additions to the Institute staff, effective the following autumn, were announced as follows:

Francis Bitter as Associate Professor in the Department of Mining and Metallurgy; *Joseph H. Keenan, '22,* as Associate Professor in the Department of Mechanical Engineering; *Robley D. Evans* as Assistant Professor in the Department of Physics; and *Edwin R. Gilliland, '33,* as instructor in the Department of Chemical Engineering.

■ Aeronautical honors came to two Alumni: to *Frank W. Caldwell, '12,* the annual Collier Trophy of the National Aeronautic Association; to *Captain Albert F. Hegenberger, '17,* the Distinguished Flying Cross.

Mr. Caldwell's award was for his invention of the controllable pitch propeller which "has revealed a new horizon in aeronautics and taken the limits off speed. Henceforth, our pace through the air will be as fast as the daring and imagination of engineers."

Captain Hegenberger's decoration was cited as being "for extraordinary achievement while participating in aerial flights. By his initiative, energy, and courage, [he] rendered exceptionally valuable services to the Government of the United States in the execution of a series of aerial flights culminating with a solo instrument flight and landing in May, 1932, in connection with the testing and development of the Air Corps system of Instrument Flying and Landing."

CHECK POINTS FOR CHOOSING AN ENGINEERING FIRM—

PICK ONE WITH EXTENSIVE PROCESS INDUSTRY EXPERIENCE

Choose a firm with a staff and facilities geared to the design, engineering and construction of chemical and petrochemical plants —and with a *proven* record in this area of industry.

The Lummus Company, for example, has built over 800 chemical process units in the last 50 years. Among them have been the world's largest butadiene plant, the world's first commercial plant to make high-pressure acetylene chemicals, and one of the least expensive anhydrous ammonia plants ever built.

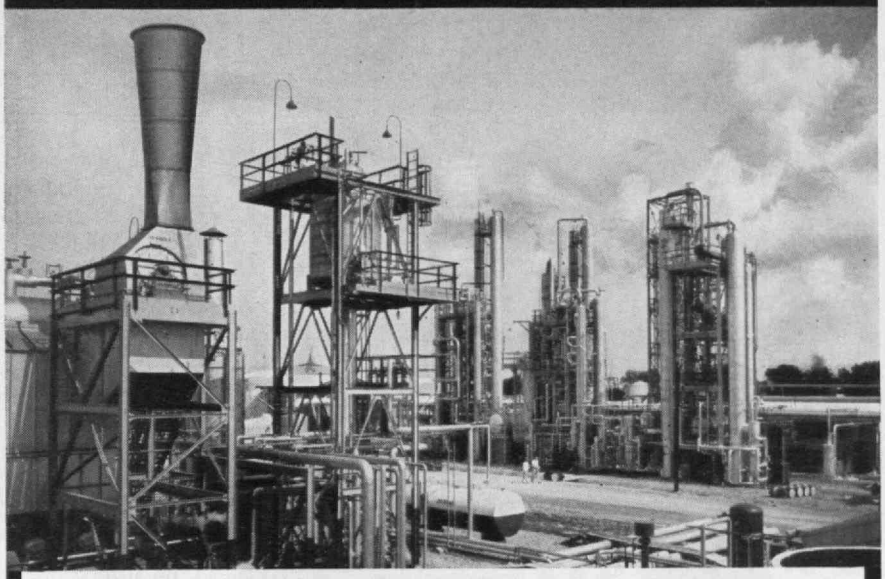
Lummus maintains a staff of highly trained specialists in seven branch offices and subsidiaries throughout the world. They are thoroughly experienced in chemical plant design and construction.

Then, too, Lummus has an Engineering Development Center to bridge the gap between laboratory research and commercial plant operation. The Center has extensive chemical pilot plant facilities in operation, and is equipped for designing and building new pilot units.

Call in Lummus when you begin plans on your next chemical plant.

Visit the Lummus Exhibit, Fifth World Petroleum Congress Exposition, New York Coliseum, June 1-5, 1959

CHEMICAL PLANTS— A SPECIALTY OF LUMMUS



ABOVE — World's first full-scale, high-pressure acetylene chemicals plant at Calvert City — engineered and constructed by Lummus for General Aniline & Film Corporation.

BELOW—Just a few examples from Lummus' long list of outstanding chemical projects.

PRODUCT	COMPANY	LOCATION
Vinyl Acetate	Air Reduction Chemical Co.	Calvert City, Kentucky
Phenol-Acetone	Progil-Electro-chimie	Pont de Claix, France
Anhydrous Ammonia	Food Machinery & Chemical Corp. (Westvaco Chlor-Alkali Division)	South Charleston, West Virginia
Phthalic Anhydride	Pittsburgh Coke & Chemical Co.	Neville Island, Pa.
Epon Resins	Shell Chemical Corp.	Houston, Texas
Bisphenol	Shell Chemical Corp.	Houston, Texas
Tetramer, Cumene, Phenol-Acetone	Societe des Chimiques des Derives du Petrole	Antwerp, Belgium
Sulfuric Acid	Inland Chemicals Canada Ltd.	Fort Saskatchewan, Alberta, Canada
Ethylene Oxide-Glycol	Calcasieu Chemical Corp.	Lake Charles, La.
Ethylene	Petroleum Chemicals, Inc.	Lake Charles, La.
Beryllium Metal	The Beryllium Corp.	Ashmore, Pa.

LUMMUS

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MAIL RETURNS

A Spelling Problem

FROM EDWARD ZETTERBERG, '25:

Would the famous Russian chemist who developed the Periodic Classification of the Elements recognize his name if he were alive today? Textbooks used have these versions.

Mendelejeff, *Vitalized Chemistry* by Jardine
Mendeleyeff, *New World of Chemistry* by Jaffey
Mendeleyev, *Biography of Mendeleyev* by Posin
Mendeleeff, *General College Chemistry*, by Richardson and Scarlett

Recently 20 pupils in a chemistry class were asked to spell this man's name. The spelling was different in every case:

Mendoloeff	Mandeleff	Mendeleof	Mendelieth	Mendolaieff
Mendelleuf	Mendelauf	Mendeleiff	Mendalith	Mendaleff
Mendaleuf	Mendalaen	Mendelief	Mendeljeff	Mendeloyeph
Mendalaiph	Mendalif	Mendolieff	Mendleth	Mendolief

Is confidence in the accuracy of science affected by authors using different spelling for the name of a great chemist?

Maybe we ought to forget about the spelling and just call him the Great Periodic Man.

Muncie, Indiana

Fission and Combustion Nomenclature

FROM FRANK S. MACGREGOR, '07:

In your November issue . . . I have been bothered by two expressions, namely, "propulsive reactor" and "power reactors" . . . I have never heard a fire box or boiler described by the purpose for which the heat is to be used. . . . Would be pleased to learn if the new nomenclature is to be considered correct.

Wilmington 5, Del.

[Asked about this, Professor Manson Benedict, '32 of the M.I.T. Department of Nuclear Engineering, said: "It has become customary to characterize reactors by the purpose served by the plant of which they are a part. I agree with Mr. MacGregor that this seems inconsistent with usage in plants employing combustion as a heat source."]